What is Claimed is:

1. A modular fluorescence sensor having the following general formula:

$$Fl-(CH_{2})_{n}-N < (CH_{2})_{m}-Bd_{1}$$

$$Sp \setminus N-(CH_{2})_{x}-An$$

$$| (CH_{2})_{y}-Bd_{2}$$

wherein:

Fl is a fluorophore;

N is a nitrogen atom;

 $B_{d1}$  and  $B_{d2}$  are independently selected binding groups, wherein the binding groups are capable of binding an analyte molecule to form a stable 1:1 complex;

Sp is an aliphatic spacer;

An is an anchor group for attaching the sensor to a solid substrate; and n = 1 or 2, m = 1 or 2, and x is an integer.

- 2. The sensor of claim 1, wherein F1 is selected from the group consisting of naphtyl, anthryl, pyrenyl, phenanthryl, and perylenyl.
- 3. The sensor of claim 1, wherein  $B_{d1}$  is  $R_1$ -B(OH)<sub>2</sub> and  $B_{d2}$  is  $R_2$ -B(OH)<sub>2</sub>, wherein  $R_1$  and  $R_2$  are aliphatic or aromatic functional groups selected independently from each other and B is a boron atom.
- 4. The sensor of claim 3, wherein  $R_1$  and  $R_2$  selected from the group consisting of: methyl, ethyl, propyl, butyl, phenyl, methoxy, ethoxy, butoxy, and phenoxy groups.
- 5. The sensor of claim 1, wherein Sp is a straight-chain alkane.
- 6. The sensor of claim 5, wherein the straight-chain alkane comprises from 1 to 9 carbon atoms.
- 7. The sensor of claim 6, wherein the straight-chain alkane comprises 6 carbon atoms.
- 8. The sensor of claim 1, wherein An comprises organic functionality.
- 9. The sensor of claim 8, wherein An comprises methyl.

- 10. The sensor of claim 8, wherein An comprises phenyl.
- 11. The sensor of claim 1, wherein An and x are selected to provide stable attachment of the sensor to a micrometer scale particle.
- 12. The sensor of claim 11, wherein the particles are suitable for use in flow cytometry.
- 13. The sensor of claim 1, wherein  $B_{d1}$ ,  $B_{d2}$ , Sp, m, and y are chosen to provide selective binding of the sensor to glucose.
- 14. A modular fluorescence sensor having the following general formula:

FI N (CH<sub>2</sub>)<sub>x</sub> An N 
$$R_1$$
  $R_2$   $R_2$   $R_3$   $R_4$  HO OH

wherein:

Fl is a fluorophore;

N is a nitrogen atom and B is a boron atom;

 $R_1$  and  $R_2$  are aliphatic or aromatic functional groups which allow covalent binding of an analyte to the hydroxyl groups forming a stable 1:1 complex, wherein  $R_1$  and  $R_2$  are selected independently from each other and;

An is an anchor group for attaching the sensor to a solid substrate; and x is an integer.

- 15. The sensor of claim 14, wherein Fl is selected from the group consisting of naphtyl, anthryl, pyrenyl, phenanthryl, and perylenyl.
- 16. The sensor of claim 14, wherein  $R_1$  and  $R_2$  are independently selected from the group consisting of: methyl, ethyl, propyl, butyl, phenyl, methoxy, ethoxy, butoxy, and phenoxy groups.
- 17. The sensor of claim 14, wherein An comprises organic functionality.
- 18. The sensor of claim 17, wherein An comprises methyl.
- 19. The sensor of claim 17, wherein An comprises phenyl.

- 20. The sensor of claim 14, wherein An and x are selected to provide stable attachment of the sensor to a micrometer scale particle.
- 21. A modular fluorescence sensor of the following formula:

- 22. A method of synthesizing a modular fluorescence sensor comprising the steps of:
  - (a) forming an asymmetric compound of the following general formula:

$$Fl$$
— $(CH_2)_n$ — $N$ 
 $Sp$ 
 $N$ — $(CH_2)_x$ — $An$ 
 $H$ 

wherein:

Fl is a fluorophore;

N is a nitrogen atom and H is a hydrogen atom;

Sp is an aliphatic spacer;

An is an anchor group for attaching the sensor to a solid substrate; and n = 1 or 2, and x is any integer; and

- (b) replacing hydrogen atoms with  $B_{d1}$  and  $B_{d2}$  groups, wherein  $B_{d1}$  and  $B_{d2}$  are independently selected binding groups capable of binding an analyte molecule to form a stable 1:1 complex.
- 23. The method of claim 22, wherein Fl is selected from the group consisting of naphtyl, anthryl, pyrenyl, phenanthryl, and perylenyl.
- 24. The method of claim 22, wherein  $B_{d1}$  is  $R_1$ -B(OH)<sub>2</sub> and  $B_{d2}$  is  $R_2$ -B(OH)<sub>2</sub>,

wherein  $R_1$  and  $R_2$  are aliphatic or aromatic functional groups selected independently from each other, and B is a boron atom.

- 25. The method of claim 24, wherein  $R_1$  and  $R_2$  selected from the group consisting of: methyl, ethyl, propyl, butyl, phenyl, methoxy, ethoxy, butoxy, and phenoxy groups.
- 26. The method of claim 24, wherein the step of replacing of hydrogen atoms comprises adding orthobromomethyl phenylboronic acid.
- 27. The method of claim 22, wherein Sp is a straight-chain alkane.
- 28. The method of claim 27, wherein the straight-chain alkane comprises 9 carbon atoms.
- 29. The method of claim 28, wherein the straight-chain alkane comprises 6 carbon atoms.
- 30. The method of claim 22, wherein An comprises an organic functionality.
- 31. The method of claim 22, wherein An comprises methyl.
- 32. The method of claim 22, wherein An comprises phenyl.
- 33. A method of labeling solid substrates, comprising:
  - (a) providing a solid substrate;
- (b) providing the modular fluorescence sensor of claim 1, wherein An is capable of being attached to the solid substrate;
- (c) reacting the sensor with the solid substrate under a condition sufficient to attach the sensor to the substrate.
- 34. The method of claim 33, wherein the solid substrate is a micro particle.
- 35. The method of claim 34, wherein the diameter of the particle is from 0.1 to 20 micrometers.
- 36. The method of claim 34, wherein the particle is a porous particle, and wherein the sensor is bound to the inside of the pores of the particle.
- 37. The method of claim 34, wherein the particle is a hydrophobic insoluble particle, and wherein the sensor is coupled to the surface of the particle.
- 38. The method of claim 34, wherein the particle is made from a material selected from a group consisting of polystyrene latex, plasticized polyvinyl chloride, glass, a

semipermeable membrane, and a bio-resorbable polymer.

39. The method of claim 38, wherein the bio-resorbable polymer is selected from a group consisting of polyglycolic acid (PGA), poly-DL-lactide-co-glycolide (PLGA), starch, and gelatin.